



# ACTT

## WORKSHOP

# ACTT

ACCELERATED CONSTRUCTION TECHNOLOGY TRANSFER  
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*MAXIMIZING*

# MOBILITY



U.S. Department of Transportation  
Federal Highway Administration



Iowa Department  
of Transportation

## Why ACTT?

- ACTT provides a fresh outlook by bringing national experts to your planning table.
- ACTT introduces innovations that have been tested elsewhere.
- ACTT saves time: according to FHWA's ACTT II report, published in March 2005, "most agencies have found ways to slice construction time by 30 percent or more."
- ACTT saves money: ACTT suggestions enabled New Jersey to reduce its budget for the Route 46 bridge project from \$10 million to \$7.2 million.
- ACTT works for you and your customer!

## How do I ACTT?

- Select a corridor: ACTT is most helpful when applied during the project development phase.
- Make a workshop proposal to ACTT team members, and submit a copy of your proposal to the FHWA Division Office. Include details on the project corridor, timeline and goals.
- Hold a pre-workshop meeting with the ACTT management team.
- Select a meeting site, and coordinate workshop details with the FHWA Division Office.
- Host the workshop.
- Draft a report for submittal to FHWA.
- Incorporate ACTT into project operations.

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# Executive Summary

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**A**s State departments of transportation (DOTs) work to reconstruct an aging national infrastructure, issues such as accelerated construction and doing more with existing revenue have become increasingly important to the Nation's highway users.

In the September 2005 report entitled *ACTT Now* (Publication No. FHWA-IF-05-039), the Federal Highway Administration (FHWA) states, "Using ACTT [Accelerated Construction Technology Transfer], State departments of transportation are searching out innovative ways to shorten construction time and reduce project costs, oftentimes by as much as 30 percent or more. The result is that millions of dollars and years of disruption have been shaved off highway construction plans and projects."

It was these very issues that the Iowa DOT was looking to address when it approached FHWA about hosting an ACTT workshop for its Council Bluffs Interstate Systems (CBIS) Improvements Project.

The project was considered an ACTT candidate for several reasons: the Iowa DOT needs to replace the deteriorating pavement and provide additional capacity; the project is complex and significant to the entire region; and it has a lengthy construction timeframe (approximately 10 years). Because the project is in the study phase, the Iowa DOT has not yet developed any cost estimates.

Moreover, the CBIS corridor crosses the jurisdictions of multiple entities – the Iowa DOT; the Nebraska Department of Roads (DOR); the city of Council Bluffs, Iowa; the city of Omaha, Nebraska; Pottawattamie County, Iowa; and Douglas County, Nebraska – requiring a significant amount of coordination. In addition:

- The average annual daily traffic (AADT) count is expected to double in some areas of the corridor by 2030.
- Residents in Omaha and Council Bluffs use this portion of the Interstate to travel back and forth for work and entertainment purposes, which means that the Iowa DOT needs to minimize inconvenience by accelerating construction.
- The project is still in the planning stage and has not received environmental clearances.
- The Iowa DOT is open to innovation and willing to consider and apply new concepts.

In discussions with FHWA and AASHTO representatives prior to the workshop, the project planning team identified eight skill sets for the CBIS Improvements Project:

- Construction.
- Innovative Contracting.
- Traffic Engineering/Safety/ITS/Public Relations.
- Geotechnical/Materials/Accelerated Testing.
- Structures.
- Right-of-Way/Utilities/Railroad Coordination.
- Roadway/Geometric Design.
- Long Life Pavements/Maintenance.

Each skill set team's goal was to focus on how the ACTT process applied to their area of expertise, while the group as a whole searched for methods and measures to help Iowa achieve its project goals. As the workshop progressed, each team summarized their thoughts and narrowed them down to a list of priority recommendations for presentation to the group on the final day.

Now that the workshop is complete, the Iowa DOT will review the skill set recommendations and incorporate them into the development of the Council Bluffs Interstate Systems Improvements Project.

## Workshop Details

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### 1.1. Opening Session

The Iowa DOT hosted its CBIS Improvements Project ACTT Workshop August 16-18, 2005, at the Mid-America Center in Council Bluffs, Iowa. Participants convened for registration and the opening session on the afternoon of Tuesday, August 16.

Iowa DOT District Four Engineer John Selmer and FHWA Transportation Engineer Lisa Rold provided opening remarks, after which the participants introduced themselves. Randy Iwasaki, deputy director for the California Department of Transportation (Caltrans), gave a presentation on “Why ACTT, Why Now,” and Iowa DOT Project Manager Tracy Roberts provided a project overview. Workshop Moderator Jerry Blanding, an innovative contracting engineer for FHWA’s Baltimore Resource Center, reviewed the workshop agenda.

Upon conclusion of the opening session, participants departed for a bus tour of the project area and returned to the Mid-America Center for dinner.

### 1.2. Workshop Process

The Iowa gathering followed the traditional ACTT workshop structure: the skill sets broke out into individual groups on Wednesday morning and came back together to present their initial findings prior to lunch. The teams intermingled early that afternoon, exchanging ideas and testing preliminary recommendations within a broader context, and then spent the rest of the day and early Thursday morning developing their final recommendations. Team spokespersons shared these with the group at the final session on Thursday.

### 1.3. Skill Set Goals

Participants in each skill set had an established group of goals that was unique to their subject area.

#### **Construction**

- Minimize cost and construct within budget.
- Minimize impacts to traffic.
- Minimize environmental impacts.
- Allow for winter maintenance.

#### **Innovative Contracting**

- Employ appropriate contracting methods to encourage the contractor to speed up construction.
- Identify contract administration methods that will allow for better utilization of State personnel.

#### **Traffic Engineering/Safety/ITS/Public Relations**

- Maintain a perfect safety record with no worker injuries.
- Keep accidents to a minimum.
- Minimize traffic incidents and disruption during construction.
- Maintain a minimum of two lanes in each direction.
- Accommodate special events (i.e., Mid-America Center events, the College World Series, etc.).
- Optimize the utilization of ITS and notification processes to reduce traffic and congestion.
- Keep the public informed of project progress, schedule and traffic operations.
- Ensure coordination throughout the corridor.



### **Geotechnical/Materials/Accelerated Testing**

- Utilize innovative methods and materials that will allow for faster construction.
- Look at opportunities to replace methods specifications with performance specifications.
- Employ new materials testing methods that will lessen the time involved or reduce personnel requirements.
- Reduce settlement times.

### **Structures**

- Reduce structures construction time.
- Reduce both the initial and the life-cycle costs of corridor structures.
- Simplify structures design.
- Construct aesthetically pleasing elements.
- Find a balance between fill height and structure length.

### **Right-of-Way/Utilities/Railroad Coordination**

- Identify ways to ensure all utilities are located early.
- Expedite utility relocations.
- Facilitate railroad coordination.
- Minimize right-of-way (ROW) delays.

### **Roadway/Geometric Design**

- Simplify system interchange designs.
- Improve local access.
- Implement context sensitive solutions (CSS).
- Construct an aesthetically pleasing project.

### **Long Life Pavements/Maintenance**

- Provide long-life pavement, preferably 50 years without a major maintenance cycle.
- Reduce snow maintenance.

# Project Details

## 2.1. Project Overview

The proposed improvements to the Council Bluffs Interstate system are intended to enhance mobility throughout the I-80, I-29 and I-480 corridors; upgrade the condition of the roadways; reduce traffic congestion and crashes; strengthen system linkages by making transitions between Interstates easier; correct functional design issues; and accommodate planned development. The corridor study will consider long-term, broadly based transportation improvements designed to address crucial travel issues in the project area. Once implemented, these improvements will bring the I-80, I-29 and I-480 corridors up to current engineering standards (Iowa DOT, Nebraska DOR and AASHTO) and modernize the existing roadway to accommodate future traffic needs.

## 2.2. Project Area

The project area is located within Pottawattamie County in Iowa and Douglas County in Nebraska. Council Bluffs, Iowa, and Omaha, Nebraska, are located across the Missouri River from one another on the east and west banks, respectively. The corridor includes approximately 18 mainline miles of Interstate and 14 interchanges (three system, 11 service). The project area includes I-80 from east of the I-480 interchange in Omaha east to US 6 (Kanesville Blvd.). It also includes I-29 from 25<sup>th</sup> Avenue to just south of U.S. 275 and I-480 from the Missouri River Bridge on the Iowa side to the I-29 interchange.

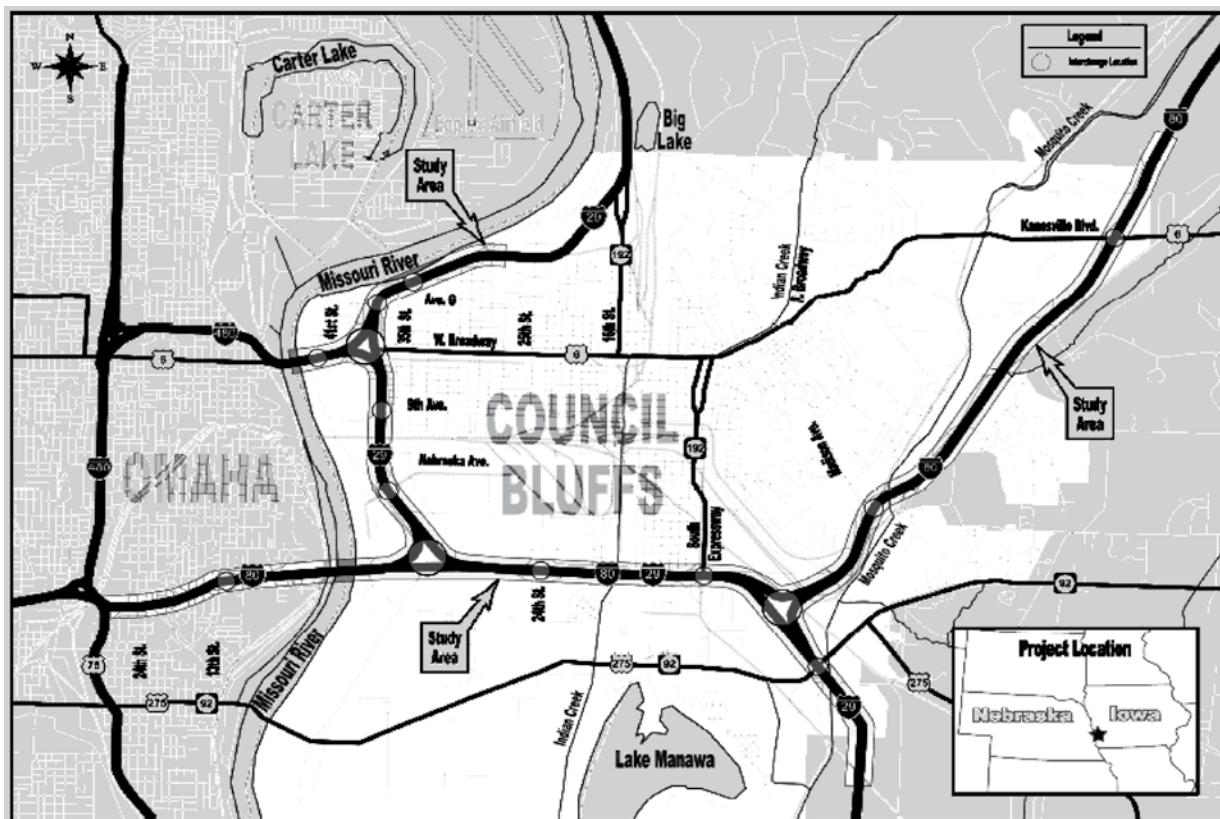


Figure 1. Project Area



## 2.3. Project Goals and Objectives

The Iowa DOT will be evaluating design options for the CBIS Improvements Project. The project team asked workshop participants to assist in developing proposed improvements by providing discussion on how best to:

- Provide a transportation system with enough capacity and operational efficiency to accommodate 2030 travel forecasts.
- Correct functional design issues such as left-hand exits, shoulder width, lane balance and ramp spacing as well as the operational issues associated with the interchange configurations.
- Improve the deteriorating conditions of the existing roadway.
- Address and reduce the occurrence of serious traffic crashes.
- Support existing and planned development in the project area.

## 2.4. Project Challenges

The Interstate system in Council Bluffs is typically used by 20,000 to 75,000 vehicles each day, of which anywhere from 11 to 25 percent are trucks. In some areas, I-80 currently carries more than twice the traffic it was designed to accommodate. Traffic on I-29 north and south of I-80 averages 20,000 vehicles per day, a figure that is expected to double by the year 2030. For the approximately two miles where I-80 and I-29 overlap, traffic is projected to increase to over 110,000 vehicles a day by the year 2030.

And the traffic counts aren't just an issue on the Interstate: several interchanges in the metro area are also carrying higher traffic volumes than they were originally designed to serve. This has resulted in congestion at numerous interchanges during peak traffic periods.

Further, most of the Council Bluffs Interstate System was constructed in the late 1960s. Although routine maintenance took place throughout the 1980s and 1990s, no major improvements have been made to the system since it was constructed. Much of the pavement and many of the bridges need to be updated and brought up to current engineering standards.

Additional challenges include:

- *Access and traffic handling during construction.* With so many employment and activity centers throughout the corridor, constructability and access are underlying concerns.
- *Affordability.* An economic and efficient design that garners community support will be vital in moving the project towards construction. The Iowa DOT has committed funds for this project; however, many other projects throughout the State are competing for these same funds.
- *Construction timeframe.* The projected construction timeframe is approximately 10 years. Ideas received at the ACTT workshop will be important in helping reduce that construction schedule. Public outreach, contractor coordination and community awareness will prove crucial to the overall success of the project.

## 2.5. Environmental Documentation

In 2001, the Iowa DOT and FHWA initiated the CBIS Improvements Project. The agencies determined that the environmental study would be conducted as a tiered, two-stage process.

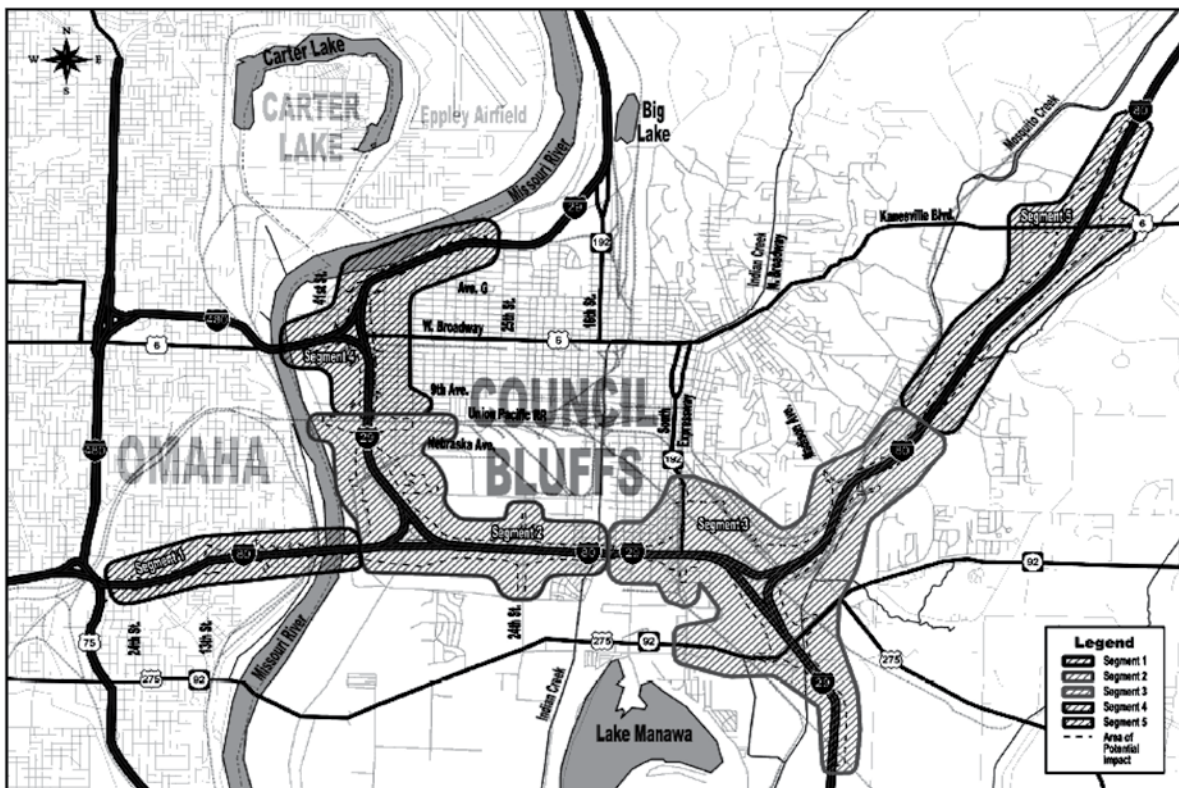
Tier 1, which is complete, consisted of an examination of the overall system needs; a study of the alternatives that would satisfy these needs; and broad consideration of potential environmental and social impacts. The examination considered the following alternatives:

- No build.
- Reconstruction of all or part of the Interstate (construction alternative).
- Enhancement of alternate modes of transportation, i.e., transit and bicycle and pedestrian trails.
- Incorporation of transportation management strategies (TDM and TSM).
- Enhancements of other metro-area roadways.
- Construction of a new cross-town roadway.

An Environmental Impact Statement (EIS) was prepared for Tier 1. Based on the Tier 1 evaluation, the construction alternative has been identified as the preferred alternative, with three key element decisions in place. They are as follows:

- Construct a new I-80 Missouri River Bridge north of the existing bridge.
- Provide direct access between I-29 and West Broadway.
- Utilize the dual divided cross-section for the overlap section of I-80/I-29.

During Tier 2, the Iowa DOT will prepare more detailed NEPA documents for the five project segments identified in Tier I. The project segments are shown in figure 2 below.



*Figure 2. Tier 2 Project Segments*

## 2.6. Project Status

FHWA has signed the Tier 1 Final EIS, and the Iowa DOT has begun detailed engineering and environmental analysis of segments one through three. A Documented Categorical Exclusion (DCE) will be developed for each of the three segments following the identification of a preferred concept (expected in 2006). Final design will begin in 2007. The first construction project, the 24<sup>th</sup> Street overhead bridge, will begin in 2008. The construction of the new Missouri River Bridge will also begin in 2008, with other projects in segments two and three to follow as funding becomes available. Segments four and five will be undertaken at a later date.

# Skill Set Recommendations

## 3.1. Construction

The construction skill set provided the following recommendations:

### Environment

- ⊙ Hire a full-time environmental management firm.
  - Be proactive to ensure compliance with Army Corps of Engineers, Department of Natural Resources, and Fish and Wildlife requirements.
  - Be timely in troubleshooting.
  - Establish credibility with resource agencies.

### Concurrent Construction

- ⊙ Construct segments two and three concurrently: it speeds up construction, reduces the need for the owner to coordinate multiple prime contracts and provides benefits to users more quickly for the same cost.
  - Consider innovative financing, which might be necessary to make this happen.
  - Acknowledge that this could reduce competition: a big project might attract large outside contractors.

### Staging

- ⊙ Build areas outside traffic first; then use new construction for detours (i.e., the east interchange). This will:
  - Reduce interference with traffic early.
  - Reduce throwaway pavement and the use of temporary surfaces.
  - Improve traffic management in later stages.
  - Maximize contractor work area.
  - Reduce costs and schedule because contractors can be more efficient.
  - Improve quality because less “cutting and fitting” will be required.
- ⊙ Develop a specific staging plan for each systems interchange.
  - Ensure that each interchange is constructible in at least one way. Having such plans might make bidding easier for contractors.
  - Use these plans to help identify the need for temporary signing.
- ⊙ Target interchange closures and shorten construction time.
  - Identify the use of diversion routes when this is done.

### Stadium Lighting

- ⊙ Locate lights away from the mainline, and aim them appropriately.
- ⊙ Construct the lights early instead of using temporary lighting, and use them for nighttime construction.
- ⊙ Aim the lights at critical traffic areas.

### Railroad Bridge over I-29

- ⊙ Use stage one and stage two of construction: this would be better for highway construction staging.
  - Talk with the railroad about having longer leads into the yard.
  - Visit with the railroad about limiting vehicle access over the bridge during construction: this would eliminate the need for a vehicle access road.

### 24th Street Bridge over I-80

- ⊙ Close the bridge for a short period of time, and coordinate with local businesses.
  - Consider non-symmetrical spans. (The new center pier would be in the existing westbound lane.)
  - Use precast units and accelerated construction technology, including roadway connections.

- Think of possible compensation for truck stops such as buying fuel from them and purchasing other support services during closure.
- ⊙ Shift the bridge slightly to the east: this would allow the bridge to be built one-half at a time.
  - Keep the connection with 24th Street from the east.
  - Explore the potential for the SEP 15 demo project to speed up right-of-way acquisition.

## Utilities

- ⊙ Consider advance utility relocation. If this is not possible, include utility relocation in the highway contract rather than making it a separate prime contract. This makes the contractor responsible for coordination.
  - Avoid delaying the start of the project; recovery can be difficult and costly.
  - Set out designated utility corridors, and use 3-D visuals and SUE (Subsurface Utility Engineering).

## Settlement

- ⊙ Reduce settlement time with wick drains. The geotech group indicated that conventional measures would be adequate in many instances but that unique solutions could be developed for specific applications.

## Coordination with Locals

- ⊙ Accelerate local traffic improvements: if the alternate routes are in good shape, local traffic will use those routes and relieve congestion on the mainline during construction. This would also prove helpful for incident management and special events planning.

## Interchange Design

- ⊙ Consider SPUI for Nebraska, 24<sup>th</sup> and Madison. Traffic movements must be balanced for best operation, and most of these interchanges have unbalanced traffic patterns.
  - Consider using this design either way to save right-of-way. Nebraska has railroad conflicts that would require a folded diamond interchange.
  - Plan for the challenges of building under traffic: it's been done in Salt Lake City.

## Mainline Railroad Bridge

- ⊙ Consider railroad consolidation to reduce the bridge length. This would save construction cost and time.
  - Address possible barrier: cooperation from the railroad.

## Noise Mitigation

- ⊙ Construct berms instead of costly sound walls. This would:
  - Reduce cost but take more right-of-way and maintenance (mowing).
  - Mitigate graffiti problems.

## Maintenance

- ⊙ Include a maintenance workshop as part of the design procedure.
- ⊙ Improve safety (fewer maintenance activities means fewer traffic conflicts) and reduce life cycle costs.

## Shoulders

- ⊙ Construct full-depth shoulders to be used for traffic during construction. This would:
  - Eliminate the need for temporary surfacing. (The incremental cost is usually reasonable.)
  - Provide a potential traffic lane in the future.

## Drainage

- ⊙ Consider drainage management during detail design. Earthwork construction will proceed faster on a well-drained project.
  - Have notes on the plans requiring contractors to manage drainage: these have not been sufficient in the past.

## **ADA Requirements**

- ⊙ Identify and incorporate ADA into plans.
  - Include specific details in the plan for better results.
  - Include temporary and permanent needs.

## **Construction Input**

- ⊙ Conduct design phase value engineering with contractors included at 30 percent design.
  - Look at this as a good investment: getting input from the builders is helpful.
  - Make construction and maintenance a part of the project management team.

## **Optimization of Capacity**

- ⊙ Consider reversible lanes and moveable barriers.
  - Have extra capacity when it is needed with lower capital investment.
  - Consider for both temporary and permanent use.

## **Traffic Control**

- ⊙ Have a contractor-proposed traffic control plan. High incentives are necessary to obtain the shortest construction timeframe.
  - Use to encourage contract innovation and give the contractor control over innovation. Past experience indicates contractors will strive to earn maximum incentive (barely), so careful thought should be invested in setting this up.

## **Contractor Construction Management**

- ⊙ Require a full-time construction manager.
  - Increase contractor responsibility for day-to-day construction administration such as invoicing, coordinating with other contractors, relocating utilities, and establishing and monitoring construction schedule.
  - Have contractor designate one person to handle all contacts.

## **Incident Management**

- ⊙ Develop incident management options from construction perspective. This will:
  - Provide improved safety for the traveling public.
  - Provide for more efficient response to/during emergencies.
  - Help out with special events planning. It could also lead to innovative solutions that are outside normal procedures but that would work well for regular construction.

## **Contract Administration**

- ⊙ Streamline the contract administration processes for shop drawings, change orders and RFIs.
  - Provide increased authority at the local level: this speeds up decision making and moves the construction process forward with fewer delays.

## **Public Relations**

- ⊙ Engage a full-time public relations firm with an on-site presence, and establish a web site with real-time traffic information.
  - Use to increase public satisfaction and decrease public interference: travelers will respond better if they understand why delays are necessary.
  - Need positive PR as well: be sure to celebrate successes.

## **Access Management**

- ⊙ Work through access management concerns with major traffic generators ahead of time to develop agreement.
  - Improve public confidence.
  - Look to business stakeholders for alternatives that might not otherwise be proposed.

## 3.2. Innovative Contracting

The innovative contracting skill set made the following recommendations:

### Major Decisions

- ⊙ Evaluate the pros and cons of large contracts.
  - Reduce/eliminate the involvement of Iowa and Nebraska contractors as prime.
  - Provide a single point of responsibility and room for contractor innovation.
- ⊙ Resolve the controversy regarding addition of silt into the Missouri River.
- ⊙ Reduce the overall construction schedule.
- ⊙ Reduce coordination and contract administration costs.
  - Provide contractor control of traffic management and business access coordination.

### Expediting Construction

- ⊙ Consider design-build (D-B) for major contracts.
  - Add the Missouri River Bridge into the segment one contract. This would:
    - ⊙ Create one large contract requiring a large bridge contractor.
    - ⊙ Have limited local contractor resistance.
  - Construct the railroad bridge as part of segment two.
    - ⊙ Use contractor/railroad negotiations to facilitate innovation.
  - Combine segments two and three.
- ⊙ Explore innovative financing methods that would expedite construction.
  - Consider having the contractor finance the cost of construction.
- ⊙ Consider advance contracts for the following:
  - Utilities relocation.
  - Ramps and overpasses, i.e., 24th Street.
  - Expediting right-of-way acquisition.
- ⊙ Add an A-plus-B bidding provision.
- ⊙ Have a provision for a no-excuse bonus.
- ⊙ Include a lane rental clause.
- ⊙ Have performance-based traffic management specs, such as:
  - Contractor-proposed traffic control plans.
  - Plans to minimize user delays in the work zone.
  - Incentives for increased safety and reduced travel time.
- ⊙ Allow more time between contract letting and project startup for planning and coordination.
- ⊙ Provide pre-final advance plans to the contractors before advertising the letting.
- ⊙ Plan for Interstate coordination: ITS plans to use the same criteria as on I-235, a reconstruction project in Des Moines, Iowa.
- ⊙ Include construction project manager (CPM) scheduling specifications, and implement this as standard practice for large projects.

### Raising the Quality Bar

- ⊙ Use quality assurance/performance specifications.
- ⊙ Provide design alternates for structures.
- ⊙ Institute special pre-qualification procedures, especially for specialty work.
- ⊙ Use multi-parameter bidding with an emphasis on quality. Use an A-plus-B-plus-C evaluation process, where C is the warranty.
- ⊙ Require warranty provisions of five to 10 years for selected projects.
- ⊙ Require maintenance contracts during construction.

### Using Innovative Contract Administration/CM

- ⊙ Have a dedicated single project/construction manager at the DOT.
- ⊙ Give the contractor responsibility for measurement, documentation and initial quantities.
- ⊙ Schedule regular project coordination meetings.



- ⊙ Consider partnering.
- ⊙ Set up an alternate dispute process with neutral facilitators.

### 3.3. Traffic Engineering/Safety/ITS/Public Relations

The traffic engineering/safety/ITS/public relations skill set made the following recommendations:

#### Design

- ⊙ Address operational issues and concerns early and throughout the design process to enhance safe and efficient travel.
  - Engage all stakeholders early and often, as was done on I-235.
  - Analyze the number of lanes needed for lane balance.
  - Maintain the required minimum number of lanes plus shoulder/clear zone storage.
  - Provide adequate acceleration lanes during construction.
  - Develop an incident management plan.
  - Do a delay simulation and determine user costs.

#### Traffic Management

- ⊙ Implement traffic management strategies to minimize user disruption and delays as well as avoid adverse socioeconomic impacts.
  - Schedule construction during off-peak hours.
  - Coordinate with local transportation systems.
  - Relay incident management strategies to all stakeholders.
  - Utilize advanced traveler information systems, alternate routes, signing, signal timing, parking restrictions and multiple jurisdictions to aid in traffic management.
  - Utilize Highway Helper/Motorist Assist.
  - Budget for ITS tools, including portable/permanent traffic observation cameras.
  - Consider lane/full roadway closures.
  - Monitor crash data throughout construction, using short reporting time periods and regular follow up.

#### Work Zone

- ⊙ “Go for zero.”
  - Have contractor develop an internal traffic control plan.
  - Increase driver awareness.
  - Provide a contractor incentive for safety.
  - Utilize a closed/protected work area instead of temporary work areas.
  - Provide inspector traffic control training and enforcement. Cross train on the process.
  - Promote work zone responsibility through a public education program.
  - Provide emergency vehicle access other than at the interchanges.
  - Set goals (both internal, i.e., zero worker injuries, and external, i.e., for workers and travelers). Strive for no increase in the crash rate during construction.
  - Address WiFi interoperability in work zones, i.e., virtual office, emergency responder communications, 911/511 center contacts, contract administration, etc.
  - Have an active enforcement presence.

#### Public Communications and Involvement

- ⊙ Develop pro-active and comprehensive two-way communications for enhanced customer satisfaction.
  - Identify the stakeholders:
    - ⊙ Chambers of commerce.
    - ⊙ Casinos.
    - ⊙ Educational institutions.
    - ⊙ Zoo.

- ◉ Qwest Center/Mid-America Center.
- ◉ Eppley Airport.
- ◉ Cities of Omaha and Council Bluffs.
- ◉ Media.
- ◉ Department of Economic Development.
- ◉ Railroads.
- ◉ Neighborhood groups.
- ◉ Old Market district.
- ◉ Emergency responders.
- ◉ Truck stops.
- ◉ Iowa and Nebraska motor truck associations.
- ◉ Tow trucks.
- ◉ AAA.
- Identify outreach opportunities through stakeholders.
- Develop early awareness of project impacts.
- Set aside a dedicated percentage of the budget for communications/public involvement staff and program management.
- Coordinate between Nebraska and Iowa public information officers.
- Develop a campaign using the I-235 model.
- ◉ Include stakeholders, media committee, big and small players, contract groups, public involvement methods (surveys and focus groups), etc.
  - Regularly analyze how you are doing through a project hotline, focus groups and other proactive strategies.
  - Create proactive public promotions for traffic management (billboards, etc.).
  - Seek innovative funding for safety promotion, both Federal and local.
  - Promote awareness and mediation among competing groups.

### 3.4. Geotechnical/Materials/Accelerated Testing

The geotechnical/materials/accelerated testing skill provided the following input:

#### **Geotechnical**

- ◉ Conduct an early subsurface investigation.
  - Conduct a phased investigation.
  - Provide for early identification of soil and groundwater. (The borrow sources are already identified.)
  - Evaluate existing foundations.

#### **Foundation Options**

- ◉ Look at the Missouri River Bridge.
  - Consider high-capacity drilled shafts or large-diameter pipe piles for the river piers.
  - Consider spread footings or driven piles for the approaches.
- ◉ Evaluate other structures.
  - Use spread footings where feasible.
  - Determine if driven piles or drilled shafts are feasible.

#### **Deep Foundations**

- ◉ Use high-capacity piles for more than 200 tons, as this would:
  - Require fewer piles and a smaller cap.
  - Minimize noise and spoils.
  - Simplify quality control, dynamic testing and inspection.
- ◉ Consider augered/drilled shafts or micro piles where vibrations are a major issue (less than 100 feet).

## **Foundation Options on Other Structures**

- ⊙ Consider other pile options, i.e., monotubes or tapertubes.

## **Foundation Options**

- ⊙ Conduct design phase load tests.
- ⊙ Conduct constructability review for foundations.
- ⊙ Let an advanced foundations contract.

## **Retaining Walls**

- ⊙ Use mechanically stabilized earth (MSE) wall structures.
- ⊙ Utilize two-stage walls where settlement is an issue. Build a wire face wall, allow it to settle and provide the permanent facing.
- ⊙ Consider reinforced soil slopes where right-of-way is available.

## **Mechanically Stabilized Earth Wall Spread Footings on MSE**

- ⊙ Consider cut wall options, noting that loess soils (fine-grained silt or clay thought to be a deposit of wind-blown dust) present unique construction issues. They include the following:
  - Soil nailing.
  - Tangent pile walls.
  - Tie backs.
  - Drilled shaft walls.

## **Embankments**

- ⊙ Excavate and replace shallow deposits.
- ⊙ Utilize surcharge with wick drains, as needed.
- ⊙ Consider column-supported embankments.
- ⊙ Consider piles and augercast embankments with lightweight fills.

## **Lightweight Fill Options**

- ⊙ Consider EPS geofoam.
- ⊙ Consider lightweight foamed concrete.
- ⊙ Consider shredded tires.
- ⊙ Consider flyash.

## **Materials**

- ⊙ Utilize high-performance steel (HPS) and concrete (HPC).
- ⊙ Consider self-consolidating concrete (SCC).
- ⊙ Precast pier caps and deck panels.

## **Testing**

- ⊙ Test for intelligent compaction.
- ⊙ Test drilled shafts for crosshole sonic logging (CSL) integrity.
- ⊙ Test driven piles for pile dynamic analysis (PDA).
- ⊙ Do special testing for contamination, grouts, ground improvement, etc.

## **Cross Cutting Issues**

- ⊙ Be prepared for contaminated soils.
- ⊙ Address the unique construction issues caused by loess soils.
- ⊙ Address utility clearance issues early.
- ⊙ Look at right-of-way constraints.
- ⊙ Consider archaeological and historically sensitive structures/context sensitive solutions.
- ⊙ Consider availability of materials and equipment.
- ⊙ Make sure safety is not compromised.

## 3.5. Structures

The structures skill set made the following recommendations.

### Preliminary Work

- ⊙ Prepare a conceptual layout for each interchange.
  - Provide a consistent structure type and appearance.
  - Reduce the number of piers by increasing the length of spans.
  - Simplify the geometry (curve/skew), where possible.
- ⊙ Conduct early geotechnical investigation and load testing.
- ⊙ Solicit early contractor input and education on atypical bridges.
- ⊙ Include user delay costs in estimate.
- ⊙ Pre-qualify and evaluate local materials, i.e., aggregate.

### Comprehensive Design Guidelines

- ⊙ Conduct a thorough evaluation of design criteria, such as:
  - Design methods.
  - Special provisions.
  - Specifications: consider performance-based.
- ⊙ Utilize standardized details/a master aesthetics plan.
- ⊙ Utilize temporary structures, i.e., Bailey bridge, Acrow.
- ⊙ Consider simple span steel girders (made continuous for LL).
- ⊙ Set the bar for a 100-year design life.
- ⊙ Include expandability of bridges for future widening.
- ⊙ Consider higher loadings (HS25 or other).
- ⊙ Incorporate necessary security measures, i.e., blast-resistant details.

### Accelerated Construction Techniques

- ⊙ Pre-assemble elsewhere and barge into place (I-80 on the Missouri River).
- ⊙ Investigate fast-cure concrete.
- ⊙ Consider segmental bridges.
- ⊙ Consider side-launching or skidding the superstructure into place.
- ⊙ Consider incremental launching.
- ⊙ Use self-propelled modular transporters (SPMTs).
- ⊙ Reduce field construction during the winter months.
- ⊙ Identify early construction before closing existing structures.
  - Consider constructing piers beneath the existing bridge.

### High Performance Materials

- ⊙ Use HPC.
  - Use slag and flyash.
  - Consider HPC overlays.
  - Use lightweight concrete.
- ⊙ Consider SCC.
- ⊙ Utilize HPS.
- ⊙ Use improved reinforcing steel, such as:
  - Stainless. May be costly.
  - Barney, with a marine-grade epoxy coating.
  - MMFX & FRP (experimental).

### Precast Concrete Elements

- ⊙ Construct using segmental elements.
  - For the superstructure, use segmental elements for the balanced cantilever, span-by-span.
  - For the substructure, use segmental elements for pier and abutment components.

- ⊙ Consider spliced P/C girders (possibly temporary shoring).
- ⊙ Consider precast decks.
  - Construct using precast full-depth deck panels.
  - Construct using stay-in-place deck forms.
  - Use precast approach slabs.
- ⊙ Consider precast retaining walls (modular or MSE) and noise walls.

### **Minimizing Maintenance**

- ⊙ Use integral and semi-integral abutments.
- ⊙ Construct utilizing low-maintenance details, i.e., joints and bearings.
- ⊙ Construct using long-life coating systems.
- ⊙ Consider two-course decks for new construction.
- ⊙ Use weathering steel.
- ⊙ Construct with smart deck technology, i.e., heating, ice detection and treatment tools.
- ⊙ Use high-performance materials.

### **Foundations and Geotechnical**

- ⊙ Consider geofoam fill materials, i.e., EPS.
- ⊙ Consider mono-drilled shafts to minimize the footprint.
- ⊙ Evaluate alternate foundations.
- ⊙ Consider drilled shaft foundations.
- ⊙ Use secant pile walls.
- ⊙ Utilize standardized foundations for sign structures.

### **Contracting Methods**

- ⊙ Consider D-B.
- ⊙ Consider modified D-B:
  - Have preliminary plans complete, including estimated quantities.
  - Bid project based on preliminary plans.
  - Work with contractor for means/methods.
  - Update quantities at later stage of design.
  - Maintain DOT control in process.
- ⊙ Consider alternate designs for selected bridges.

## **3.6. ROW/Utilities/Railroad Coordination**

The ROW/utilities/railroad coordination group made the following recommendations:

### **ROW**

- ⊙ Identify needs.
  - Identify and acquire special properties, i.e., project office, petroleum farm.
  - Summarize ROW needs and impacts.
  - Study needs of businesses.
  - Identify neighborhood groups for future information.
  - Have relocation plan in place early. This also helps utilities.
  - Address environmental justice issues.

### *Administration*

- Have on-site ROW/project/utilities office.
- Assign applicable field staff, including a full-time clerical person.
- Have a project web site.

### *Implementation Tactics*

- Identify ROW needs at 30 percent design.
- Seek out innovative financing for funding ROW.
- Deal with problem locations early and complete segments to meet schedule.
- Meet with stakeholders regularly.

## **Utilities**

- ⊙ Provide early identification and location of utilities.
  - Utilize the Subsurface Utilities Engineering (SUE) process.
  - Prepare an accurate GIS map of utilities.

### *Administration*

- ⊙ Set up a local project office.
- ⊙ Assign two full-time utility coordinators (one in administration and one in the field).
- ⊙ Have one person from each utility company designated as the DOT contact.
- ⊙ Schedule monthly utility meeting and include design personnel.
- ⊙ Specify CADD and GIS platforms for the project.
- ⊙ Consider security issues.

### *Implementation Tactics*

- ⊙ Buy enough ROW to accommodate utilities.
- ⊙ Put utilities within green space with off-corridor access.
- ⊙ Build common ducts for all communication cables (including ITS).
- ⊙ Designate utility corridors for crossing the Interstate.
- ⊙ Identify bridge attachments.

## **Railroads**

- ⊙ Identify needs.
  - Hire an independent expert to do a study of the rail systems.
  - Meet with the Iowa Motor Truck Association (IMTA).
  - Collaborate with city officials, railroads, et al.

### *Administration*

- ⊙ Designate railroad coordination function.
- ⊙ Hold railroad coordination meetings.

### *Implementation Tactics*

- ⊙ Identify mutual benefits and sharing of costs, i.e., I-29 and 9th Avenue UP bridge, the east systems interchange, etc.
  - Eliminate BNSF south of I-80/South Expressway interchange.
  - Abandon BNSF tracks at Weyerhaeuser.
  - Shift UP yard east to eliminate one set of tracks over the bridge.
  - Stage construction/roll-in construction of bridge.
- ⊙ Relocate railroads south of town.
- ⊙ Construct an intermodal facility (with railroad corridor and truck stop relocation).

## **3.7 Roadway/Geometric Design**

The roadway/geometric design skill set offered the following suggestions:

### **System Interchange Designs**

- ⊙ Revise the two-lane I-29 southbound entrance ramp from 23rd Avenue, and realign the connections to the Interstate to improve driver expectancy: left lane goes left, and right lane goes right.
- ⊙ Acquire right-of-way to build future collector-distributor (C-D) system between east system interchange and 275 interchange.



## Local Access

- ⊙ Re-visit building a potential SPUI at 24th and Madison.
- ⊙ Develop an access management plan for roads away from the ramp terminals (try 1,350 feet).
- ⊙ Seek general consolidation of railroads and abandonment of BN line through the power mall.
- ⊙ Provide a better circulation route around casino, MAC, etc.
- ⊙ Develop north-south arterials across the railroad yard and along Indian Creek.
- ⊙ Provide a local road crossing from Council Bluffs to Omaha.
- ⊙ Add a road to the proposed pedestrian bridge.
- ⊙ Grade separate at the railroad near Ameristar.

## Aesthetic/CSS

- ⊙ Where possible, build in additional right-of-way for green space behind noise walls.
- ⊙ Form an aesthetic design advisory committee.

## Other Options Considered

- ⊙ Provide for expandability.
  - Buy right-of-way to widen median for future additional lanes.
  - Consider slopes, drainage and barrier type for flexibility.
- ⊙ Consider crossovers for emergency access, especially from 13th Street in Omaha to US 275.
- ⊙ Consider five-track line bridge options over I-29 (temporary and permanent).
- ⊙ Consider putting I-29 over the railroad.
- ⊙ Consider all operational issues during construction phasing.
  - Accommodate adequate speed change lanes in MOT plans.
  - Accommodate emergency pullouts in MOT plans.
  - Create a Transportation Management Plan (TMP) prior to or during preliminary engineering.
  - Plan for drainage, construction joint patterns, etc.

## 3.8 Long Life Pavements/Maintenance

The long life pavements/maintenance skill set provided the following input:

### Minimal Maintenance – No Daytime Lane Closures for 50 years

- ⊙ Plan for the following: sealing joints and cracks and restoring friction and ride to pavement surface.
- ⊙ Address the challenges that construction sequencing, construction time limitations and present contracting methods may present in terms of constructing long life pavements.
- ⊙ Address lack of expertise/experience among the agencies and contractors.

### Performance Indicators – IRI, Distress, Friction, Noise

- ⊙ Use the performance indicators as initial performance/construction standards.
- ⊙ Use the performance indicators in a warranty contract for pavement rehabilitation.
- ⊙ Determine if limits/thresholds on the performance indicators would be a barrier.
- ⊙ Minimize noise walls.
- ⊙ Use open graded surface course, pervious pavement to reduce noise.

## Pavement Types

- ⊙ Consider the following pavements options:
  - Stone matrix asphalt.
  - CRCP.
  - Perpetual pavement.
  - Composite pavement.
  - Subgrade treatment.
  - Subgrade stabilization.

- Subbase width.
- Pavement drainage.

### **Warranty – Bonding Issues**

- ⊙ Address issues raised by length of bond and multiple contractors (i.e., who is to blame when something goes wrong?). Consider A-plus-B bidding.

### **Design-Build (D-B)**

- ⊙ Address legal issues: D-B is illegal in Iowa.
- ⊙ Use a consortium: Iowa has no contractors large enough to attack this problem.
- ⊙ Determine if the Iowa DOT embraces this concept.
- ⊙ Factor in that D-B allows for quicker design changes, which means that facilities would be open to the public sooner.

### **Construction Staging and Sequencing**

- ⊙ Determine if the road could be closed for an extended period of time.
- ⊙ Determine if the east or west bound lanes only could be closed.

### **Contractor Access**

- ⊙ Address need for land space.
- ⊙ Determine if the State can buy the space and furnish contractor access.

### **Accelerated Construction**

- ⊙ Consider a 24/7 total closure or closure in one direction.
- ⊙ Address concerns such as business impacts, increased construction costs and potential traffic tie-ups elsewhere.

### **Innovation – Contracts**

- ⊙ On small contracts, determine who is responsible for project management.
- ⊙ Evaluate whether bigger contracts would minimize costs.
- ⊙ Determine how large a contract is needed to attract D-B.
- ⊙ Designate one contractor for pavement and embankment construction: this would eliminate “passing of the buck.”

### **Innovation – Lane Rentals**

- ⊙ Don’t pay for lane rental. Maintain traffic speed at 45 mph.
- ⊙ Use traffic monitors like side-fired radar to determine speed or density.

### **Contract Maintenance**

- ⊙ Use on-call maintenance to fix problems outside of the contractor’s responsibility.

### **Snow Removal and Storage**

- ⊙ Address need for additional storage locations, as shoulder storage areas may be insufficient inside the dual divided portion.
- ⊙ Evaluate whether throwing snow onto traffic below on the fly-overs will be an issue.
- ⊙ Address manpower issues for snow removal because of the pavement width. Could be solved with platoon plowing.
- ⊙ Consider automatic de-icing of the rails on bridges.
- ⊙ Use multiple-lane snowplow trucks.
- ⊙ Heat pavements and barrier rails with waste heat from power plants.

### **Incident Management/Redundancy**

- ⊙ Build fly-overs two lanes wide but stripe for one lane, with full depth and full width inside and outside shoulders.
- ⊙ Install permanent maintenance signs that are removable or easily activated.
- ⊙ Utilize ITS, DMS and traffic sensors.
- ⊙ Install median cross-overs for emergency vehicles and snow plows.

### **Sign Maintenance**

- ⊙ Construct catwalks.
- ⊙ Use rotating/permanent signage that is removable or easily changed.
- ⊙ Consider signs on tracks.

### **Innovations – Luminary changes**

- ⊙ Consider mast lighting, stadium lighting and/or swing mast arms.

# Conclusions

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## 4.1. Next Steps

The Iowa DOT and the CBIS project team will be evaluating the recommendations from the skill sets, defining and developing each to the point that Iowa can evaluate its potential benefits and value to the project. The Iowa DOT realizes that it may not have the opportunity to utilize all of the ideas put forth by the skill sets on this corridor. However, a number of ideas arising from the workshop have the potential to be utilized on other projects.

The Iowa DOT plans on holding future workshop sessions with FHWA to assess the long-term benefits of the workshop and the applicability of each recommendation to the CBIS project.

As the ideas and innovations in this report show, the collaboration of national experts and local representatives has proven valuable in the acceleration and success of the Council Bluffs Interstate Systems Improvements Project.

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## Appendix B

# IOWA ACTT Skill Set Recording Forms

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# CONSTRUCTION

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CONSTRUCTION SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Railroad bridge contract	(Accelerated Construction) Use accelerated contract for railroad bridge over I-29.	Railroad cooperation: does not affect traffic, why hurry? Need longer lead time.
Shoo fly	(Accelerated Construction) Consider shoo fly for railroad bridge.	Shoo fly could expand capacity for railroad but costs more because of signals. We will not pursue; drop.
Twin bridges	(Accelerated Construction) Use Stage 1 and Stage 2 of construction. See Figure 5-13 from the Refined Build Concept Report.	Railroad might like having longer extra leads into the yard. Better for highway construction staging. Railroad might be willing to limit vehicle access over the bridge temporarily during construction, thus eliminating the need for space for a vehicle access road.
24th Street	(Accelerated Construction) Pre-cast off site.	Need to speed up construction time and maintain access to truck stops. Note that new center pier will be in existing westbound lane. It will be most important to accommodate eastbound truck movements to the truck stops (business survival).
24th Street	(Accelerated Construction) Shift bridge to east slightly.	Allows bridge to be built one-half at a time. Keep connection with 24th Street from the east.
24th Street	(Accelerated Construction) Close bridge for a short period of time and coordinate with businesses.	Use precast units and accelerated construction technology. Can a bridge be built in half a season? Understand that roadway connection must be made to the bridge and this takes time, also. Think of possible compensations such as buying fuel from them and purchasing other support services.
24th street	(Accelerated Construction) Use innovative contracting.	Explore potential for SEP 15 demo project to speed up ROW acquisition.

## CONSTRUCTION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Dredging	(Constructability) Develop an environmental management plan.	Consider compliance with clean water, COE, DNR, Fish and Wildlife, especially with regard to Lake Manawa and the Missouri River. Resolve controversy regarding the addition of silt into the Missouri River, and develop mitigation measures to address construction impacts. There may be concerns on where to store material so it does not negatively impact neighbors (settlement, dust, runoff) or utilities (settlement). Look for opportunities to use stockpile as surcharge.
Environment	(Constructability) Hire a full-time environmental management firm.	Proactive approach, sole control, timely troubleshooting, establishing credibility with resource agencies.
Traffic control	(Construction Management) Have a contractor-proposed TCP with incentives and disincentives.	Encourages contract innovation and gives contractors control over innovation. Past experience is that contractors will strive to earn the maximum incentive (barely), so careful thought should be invested in setting this up. High incentives are necessary to get the quickest turnaround.
Concurrent construction	(Constructability, Accelerated Construction, Design) Make use of temporary closures, and optimize capacity on detours.	Some kind of innovative financing will likely be necessary. Speeds up construction and reduces need for owner to coordinate between multiple prime contracts. Seems likely that structures should be started first. Road users obtain benefits sooner for the same costs. Segment 1 may be difficult to put in the same contract because it will be administered by Nebraska. There may be concerns about reduced competition if local contractors cannot handle this. However, locals may joint-venture, and a large project may attract large outside contractors. Locals will likely have the opportunity to subcontract for large national primes.

CONSTRUCTION SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Staging	(Constructability) Provide maximum contractor work area.	Will likely reduce costs because contractors can be more efficient – this would also reduce the schedule. Quality will likely improve because less “cutting and fitting” will be required. It is apparent that there is a lot of space available for this use, especially near systems interchanges.
Utilities	(Accelerated Construction) Do advance utility relocation. If not possible, include with highway contract rather than letting is as a separate prime contract.	Poor performance with this item could delay the start of the project, and recovery would be difficult. If the utilities are included in the highway contract, the contractor is the entity that is responsible for coordination.
SPUI	(Design) Consider SPUI for Nebraska Avenue, 24th Street, Madison Avenue.	Traffic movements must be balanced for best operation. Most of these interchanges have unbalanced patterns. It may be worth doing anyhow to obtain the benefits of saving ROW. Nebraska has railroad conflicts that require folded diamond. It would be difficult to build under traffic but has been done in Salt Lake City.
Outside first	(Constructability) Build items outside traffic first; then use as detour.	Minimizes traffic disruption and temporary surface use. Good for traffic management in later stages.
Construction management	(Construction Management) Engage full-time construction manager.	Increase contractor responsibility for day-to-day construction administration such as invoicing, coordinating with other contractors, managing utilities, and establishing and monitoring schedule. Contractor would need to designate one person to handle all contacts.
Public relations	(Public Relations) Engage full-time public relations person with on-site presence, and establish web site with real time traffic information.	Better-informed constituents interfere less with construction and are more satisfied if they understand why delays are necessary. Some positive PR is effective: make sure to celebrate successes.



## CONSTRUCTION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Reducing settlement time	(Accelerated Construction) Reduce settlement time with wick drains.	For this project, geofoam is unlikely to be necessary except in a few instances (feedback from geotech group).
Staging plans	(Constructability) Develop a specific staging plan for each systems interchange (one contract).	Ensures that it is contractible in at least one way. Having such plans can make bidding easier for contractors and may help in coordination with subs. This may also be helpful for temporary signing. We need to recognize that the successful bidder will likely change the plan to fit its particular needs.
Railroad consolidation	(Design) Consider railroad consolidation to reduce bridge length.	Potential to save cost and time in construction. Possible barrier: railroad cooperation.
Local options	(Accelerated Construction) Accelerate local traffic improvements.	If alternate routes are in good shape, local traffic will use those routes and relieve congestion on mainline during construction. Also helpful for incident management.
Incident management	(Construction Management) Develop incident management plan. Include options from construction perspective.	Safety for traveling public increases because incidents are handled efficiently and with confidence and certainty, thus allowing the situation to be resolved quickly. The thinking that goes into this will help people think out of the box and come up with innovative solutions that are outside normal procedures but work well for regular construction. Will help out with special events planning.
Berms	(Design) Construct berms instead of costly sound walls.	Reduces cost but takes more R/S and maintenance (mowing).
Lights	Use stadium-type lighting.	These lights can be located away from the mainline and aimed appropriately. The lights could be constructed early (instead of temporary lighting) and used for nighttime construction, then retained for permanent lighting at a reduced level compared to construction lighting. Lights can be aimed at critical traffic areas. Precedents exist for using median barrier-mounted lighting in Salt Lake City.

CONSTRUCTION SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
PCC and/or ACC	(Accelerated Construction) Use fast track techniques, especially at intersections. (Also fits Long Life Pavements/Maintenance.)	Accelerates construction and minimizes traffic disruption; improves access.
	(Long Life Pavements/Maintenance) Use long-life pavement, PCC, 12" dowels or perpetual HMA.	Minimizes long-term pavement costs.
Bridge berms	(Constructability) Accelerate bridge berm construction.	Bridges are often built in winter, and grading must be done in summer. Make sure the berms are ready for the bridge.
Administration	(Construction Management) Streamline administrative processes for change orders and RFIs.	Increased authority at local level speeds decision-making and moves construction process forward with fewer delays.
Maintenance considerations	(Long Life Pavements/Maintenance) Ask contractors to recommend and demonstrate maintenance procedures. Include long-term maintenance.	Improves safety (fewer traffic conflicts if fewer maintenance activities occur) and reduces life-cycle costs.
Maintenance workshop	(Design) Include a maintenance workshop as part of the design procedure to ensure that maintenance on the completed project is feasible.	Improves safety (fewer traffic conflicts if fewer maintenance activities occur) and reduces life-cycle costs. Get maintenance buy-in on completed facility. This item originated during discussion of how to remove snow from the dual divided.
Constructability reviews	(Design) During design, conduct construction reviews of plans.	Needs to be reviewed in early stages when changes are still relatively easy to make. Make construction and maintenance part of project management team.

## CONSTRUCTION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Use of detours	(Constructability) Use detour roadways as base for final facility.	Similar to previous item on start outside first.
Shoulders	(Design) Construct full depth shoulders to be used for traffic during construction.	Can replace the need for temporary surfacing, and incremental cost is usually reasonable. Can be used as a traffic lane in future.
Targeted closures	(Constructability) Target interchange closures and shorten timeframes.	See 24th Street. Consider optimizing diversion routes when this is done.
Drainage management	(Design) Consider drainage management ahead of time.	Earthwork construction will proceed faster on a well-drained project. Notes on plans requiring contractors to coordinate have not been sufficient in the past.
Dual design	(Design) Reconsider dual design; going from 4 to 12 lanes seems unusual. Get maintenance input.	This is a done deal now; probably cannot be reconsidered.
Utility corridors	(Design) Set out designated utility corridors and use 3-D visuals and SUE owners.	Minimizes conflicts during construction, saves money and speeds construction. Also supported by utilities group.
Access management	(Public Relations) Work through access management concerns with major traffic generators ahead of time.	Improves public confidence. Business stakeholders may add to innovative thinking by suggesting alternatives that would not otherwise be proposed.
ADA	(Design) Identify and incorporate considerations of disability access into plans.	Contractor will do a better job on this because the specifics are in the plan. Include temporary and permanent.
Value engineering	(Design) Conduct design phase value engineering with contractors included at 30 percent design.	Getting input from builders is almost always helpful. This is a good investment in effort.
Reversible lanes	(Design) Consider reversible lanes and moveable barriers such as Lake Shore Drive in Chicago and others.	Get extra capacity when it is needed with lower capital investment. Could be both permanent and/or temporary.
Material selection	(Design) Consider construction time in material selection.	Material selection can either enhance or inhibit timely construction. Consider early procurement strategies.

# INNOVATIVE CONTRACTING

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## INNOVATIVE CONTRACTING SKILL SET

**IDEA**  
(Short Name)

**IDEA**  
(Detailed Description)

**Implementation Details**  
(Barriers, Skill Set Coordination, etc.)

### **Expedite construction and minimize impact to users**

*The current project schedule is financing driven. The main objective for minimizing project duration is to minimize service disruption and impacts to users.*

Design-build (D-B)

Combine design and construction under one contract. Have single point responsibility for cost, quality, schedule.

Design-build is restricted by Iowa and Nebraska codes, but an exception is possible under special legislation for such a large project. Missouri River Bridge (the I-80 and railroad bridge) is an example where D-B could be applied. The key issue is legislative approval for the project. These projects are too large for local contractors.

Advance contracts

Finish some of the preliminary work that doesn't impact traffic before starting the actual projects. Could be overpasses, utilities, ROW, etc.

Use lane rental in advance contracts to minimize traffic impact to the corridor.

A-plus-B bidding and lane rental

Bid for both cost (A) and time (B), and use incentives and disincentives to meet or beat the B date. Lane rental motivates contractors to minimize time that lanes are taken out of service.

A-plus-B bidding has been used in Iowa. The method of calculating DRUC is not very well formalized. A-plus-B contracts have been used as incentive/disincentive contracts because contracts get an equivalent of the DRUC if they complete early. Also no-excuse bonuses have been used in Iowa projects. These bonuses are awarded for completion of the project by a certain date. The date is usually set to be a really important event such as the College World Series.

Road closure strategies

Consider complete closure of the roads affected by the project.

The options for closure of the highway are complete closure or diversion of about 70 percent of traffic to other highways such as I-680 or I-480. The traffic in the area is mainly local, which makes complete closure difficult.

## INNOVATIVE CONTRACTING SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Performance-based traffic management	Motivating contractors to minimize disruption to traffic during the project by using incentives for better-than-expected travel time in work zones and, possibly, for the number of accidents per unit of time (safety-based).	Use incentive-based or performance-based traffic management: lack of congestion or increased safety could be used. The goal and plan for traffic performance has to be set reasonably and within the limits of the control of the contractors. The contractors should set the plan and goals.
Time between contract letting and project startup	Contractors often don't have enough time between contract award and mobilization to do any thorough project planning.	Contract letting should take place well in advance of the project startup to allow time for contractor mobilization and advance planning. Plans could be made available online before the actual solicitation of the project to allow time for the contractors to study the project and address any questions they may have; sometimes this results in feedback similar to constructability reviews.
Traffic management and coordination	Tools need to coordinate traffic for the life of the project between the two States.	Traffic management is being coordinated between Nebraska and Iowa through tools such as dynamic message boards. (Discuss with ITS group.)

### Evaluate impact of contracting methods on quality of the end product

*Contracting methods are shifting responsibility for construction quality supervision to contractors. Time has an impact on quality, and in large projects the time is limited. How does project scheduling affect quality?*

Quality assurance- and performance-based specifications	Specify the requisite quality for the final construction product.	Application of performance-based specifications is expected to place greater responsibility and control for quality on the contractor. They have been applied on asphalt pavements, concrete pavements, some bridge components and, to some extent, in earthwork. Allowance for design alternates could help improve quality. This should be discussed with the structures group, especially for bridges.
Contractor prequalification	Determine the process by which contractor quality is considered in qualifications.	Pre-qualifying contractors is based on finances and experience. A special qualification form could be considered. Most of the work is done by local contractors, which makes them more cooperative.

## INNOVATIVE CONTRACTING SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Quality incentives	Provide incentives for meeting or exceeding the specified quality.	Quality incentives could be applied. They have been applied on some types of quality indicators such as roughness of pavement and pavement density. The application of innovative contracting methods that have not been tried involves some risk.
Multi-parameter bidding	Evaluate bids on a quality-indicating parameter. Implement as A-plus-B-plus-C, where C is a warranty provision. Contractor will bid the number of years for a warranty and realize savings in his bid for each year warranted beyond the minimum specified.	Multi-parameter bidding has been used to allow contractors to bid on quality-indicating parameters such as warranties. Iowa has not applied warranties because the way it was proposed was restrictive to contractors. Some other States have applied warranties in a less restrictive method. There is limited history of the use of warranties, and therefore there is no history of any call-backs. DOTs that have applied warranties report improved qualities as a result.
Maintenance contracts	These are contracts that the DOT awards to contractors to maintain segments of highways.	Maintenance contracts have been used for some types of work in Nebraska and Iowa. They have not been applied for stretches of highway but could be used for multiple season projects where the contractor would maintain the road during winter.
<b>Explore how to compress overall 15-year schedule to minimize impacts</b> <i>Communities surrounding the project are adversely affected by projects that extend for long periods of time. Methods for minimizing that adverse impact should be investigated further.</i>		
Breaking down of projects over several seasons and contracts	Typical project breakdown extends for several construction seasons.	Iowa projects are typically broken down into numerous phases that are scheduled over several construction seasons. This may lead to the project being broken down into several contract packages. The problem with this approach is that road closures occur over multiple seasons over various years. Allowing contractors to do some structural work outside of the season could help alleviate this impact.

## INNOVATIVE CONTRACTING SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Work coordination	Coordinating projects between States could help each State select high-priority projects without impacting the other.	Coordination of projects in the State borders area could help each State select projects that are of higher priority. For example, if Nebraska does not start any major projects in highways adjacent to Iowa, traffic from I-80 could be diverted that way.
Major interchanges	Minimize the impact of interchange construction.	The scheduling of work in major interchanges in one season could help avoid congestion in subsequent years.

### Consider contract packaging and bundling

*The overall project is broken down into five segments performed more or less sequentially. How will these segments be broken down and sequenced into a number of projects, ranging anywhere from 30 to 100? Are smaller advance contracts going to be used?*

Repackaging to do work in segments concurrently	During the first segment, including Missouri River Bridge, local road improvements and advance contracts could be performed for segments 2 and 3. Portions of segments 2 and 3 could then be performed concurrently, contingent on adequate funding, to reduce the overall project duration.	Do structure, including interchanges and rivers, first. Then do the outside lanes, then the inside, to minimize impacts to traffic. Implementation issues are funding the work in a short timeframe and determining how to divide the work into a number of contracts. One possibility is separate contracts for structures and roadways.
One large contract for most of the project	This contract will mainly include the first three segments of the project (the bridge and two interchanges). The remaining segments could be performed later on.	Bonding and local contractor participation is expected to be a problem. The authority to perform D-B is also an issue. There may be a significant cost and time savings to the project if it is built much sooner under a single large D-B contract instead of funding and constructing it far into the future under many separate contracts.



## INNOVATIVE CONTRACTING SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
<b>Innovative contract administration</b>		
Project management and project staff/CPM scheduling	Use an overall project or program manager for the entire program to promote consistent management practices for all projects. CPM scheduling is needed to manage the overall program and the major projects. Use CPM as a standard practice for large projects. Projects should be staffed with a dedicated project manager.	The distribution of responsibilities for DOT supervisory staff in construction projects is geographic, not by discipline. The importance of having a dedicated project/program manager must be emphasized. CPM scheduling is not a standard practice, and the requirements are being changed. Nebraska requires a CPM schedule for their projects. Iowa has required CPM schedules in some experimental projects. The DOT staff also may need to have CPM training.
Project coordination meetings/partnering	Use periodic coordination meetings to coordinate work, particularly if work is bundled into many smaller contracts. A master schedule can be used to aid in sequencing and coordination. Use partnering to set up working relationships and expedite decision-making process.	For a large project with many contracts, need dedicated staff and higher level of coordination. Special coordination meetings, in addition to project meetings, will aid in coordinating contracts. Partnering can also be used as a tool to make timely decisions, solve problems and keep the job moving. For partnering to be effective, Iowa must conduct periodic follow up meetings.
Alternate change order and disputes process	Set up a dedicated project committee or panel empowered to review change orders/claims and expedite decision-making process.	Streamline the standard administrative processes for changes and claims. Standard processes often take far too long and affect progress of the work. To keep project on track, set up a dedicated project dispute resolution team that can make decisions faster.

# TRAFFIC ENGINEERING/SAFETY/ITS/PUBLIC RELATIONS

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## TRAFFIC ENGINEERING/SAFETY/ITS/ PUBLIC RELATIONS SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Design	Operational issues and concerns need to be addressed early and throughout the design process to enhance safe and efficient travel.	<p>Engage/coordinate with all stakeholders early and often, i.e., 235 model (1-8).</p> <p>Analyze number of lanes needed/lane balance (2,3,6,8).</p> <p>Maintain minimum lanes plus shoulder/clear zone storage (2,3,6,8).</p> <p>Keep acceleration lanes (1,2,3,5,6,8).</p> <p>Maintain the merging areas for the two Interstate routes (1,2,3,6,8).</p> <p>Design traffic control to match the prevalent speeds (2,3,8).</p> <p>Provide for drainage during construction (1,2,3,4,5,7).</p> <p>Do adequate incident management planning (1-8).</p> <p>Delineate roadways (2,3,5,8).</p> <p>Conduct special events identification and analysis (3,8).</p> <p>Do a delay simulation, and determine user costs (2,3,6,8).</p> <p>Address environmental justice issues (2, 7,8).</p> <p>Ensure utility coordination (ITS) (7,8).</p> <p>Provide adequate traffic signing before, during and after construction (1,2,3,5,8).</p>

**NOTE:** *These groups are identified in the Implementation Details column as group numbers; i.e. (2, 3, 5, 6)*

1. Structures
2. Roadway/Geometric Design
3. Construction
4. Geotechnical/Materials/Accelerated Testing
5. Long Life Pavements/Maintenance
6. Innovative Contracting
7. ROW/Utilities/Railroad Coordination
8. Traffic Engineering/Safety/ITS/Public Relations

## TRAFFIC ENGINEERING/SAFETY/ITS/ PUBLIC RELATIONS SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Traffic management	Implement traffic management strategies to minimize user disruption/delays as well as avoid adverse socioeconomic impacts.	<p>Do construction during off-peak work hours (1,3,5,6,8).</p> <p>Coordinate with local transportation systems (3,4,5,8).</p> <p>Provide for incident management (all stakeholders)/early completion (1-8).</p> <p>Use advanced traveler information systems, alternate routes, signing, signal timing, parking restrictions, multiple jurisdictions (2,3,5,6,7,8).</p> <p>Use active law enforcement for traffic calming (3,8).</p> <p>Utilize Highway Helper/Motorist Assist (3,6,8).</p> <p>Monitor crash data throughout construction, using shorter reporting time periods and regular follow up (3,8).</p> <p>Budget for ITS tools such as permanent/portable traffic observation cameras (management issue) (2,3,6,7,8).</p> <p>Consider lane/full roadway closures (1,2,3,6,8).</p> <p>Provide for railroad coordination (1,7,8).</p> <p>Consider permanent signing for maintenance activities (5,8).</p>

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## TRAFFIC ENGINEERING/SAFETY/ITS/ PUBLIC RELATIONS SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Work zone	“GO FOR ZERO.”	<p>Have internal traffic control plan developed by contractor (2,3,6,8).</p> <p>Increase driver awareness (8).</p> <p>Provide for Iowa/Nebraska coordination and continuity (1,2,3,4,8).</p> <p>Provide incentives for safety (3,6,8).</p> <p>Utilize closed/protected work areas, not temporary ones (2,3,7,8).</p> <p>Utilize predictive/intrusive ITS technology (2,8).</p> <p>Provide inspector traffic control training and enforcement–corrections–related staff reporting–cross training–process (3,8).</p> <p>Emphasize that work zone safety is public responsibility (8).</p> <p>Provide emergency vehicle access at locations other than interchanges (2,3,4,5,8).</p> <p>Require contractor to maintain traffic control and manage crashes (3,6,8).</p> <p>Set goals (internal – zero worker injuries, external – workers/others). Strive for no increase in crash rate during construction (3,6,8).</p> <p>Address WiFi interoperability in work zone, i.e., virtual office, emergency responder communications, 911/511 center contacts, contract administration (3,7,8).</p> <p>Provide active enforcement (presence, automated) (3,8).</p>

**NOTE:** *These groups are identified in the Implementation Details column as group numbers; i.e. (2, 3, 5, 6)*

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## TRAFFIC ENGINEERING/SAFETY/ITS/ PUBLIC RELATIONS SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Public communications and involvement	Develop pro-active and comprehensive two-way communications for enhanced customer satisfaction.	<p>Identify the stakeholders: economic/chamber/casinos/educational institutions/zoo/Qwest Center/cities of Omaha and Council Bluffs/local governments/Eppley Air Field/Dept. of Economic Development/neighborhood groups/media/emergency responders/railroad/Old Market/truck stops/motor truck associations/AAA/wreckers/etc. (1-8).</p> <p>Do public outreach. Identify opportunities for dissemination through stakeholders (8).</p> <p>Promote early awareness of project impacts (2,7,8).</p> <p>Set aside a percentage of the budget for communications staff and program management.</p> <p>Coordinate between NE and IA public information officers (8).</p> <p>Develop a campaign (I-235 model) that includes stakeholders, media committee (big and small players), contract groups, methods and public involvement techniques such as surveys and focus groups (8).</p> <p>Identify special events (2,3,5,8).</p> <p>Make communication an ongoing joint NE/IA effort (1-8).</p> <p>Be proactive – “How are we doing?” (8).</p> <p>Strive for goal of two-way communication and involvement between DOT/DOR and users (3,8).</p> <p>Develop proactive public promotions for traffic management (billboards, etc.) (8).</p> <p>Seek innovative funding for safety promotion (Fed or local) (6,8).</p> <p>Promote awareness and mediation among competing groups (8 + management).</p> <p>Develop design/aesthetics using public involvement (managed by committee) (1,2,8).</p>

**NOTE:** *These groups are identified in the Implementation Details column as group numbers; i.e. (2, 3, 5, 6)*

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7. ROW/Utilities/Railroad Coordination
8. Traffic Engineering/Safety/ITS/Public Relations

## GEOTECHNICAL/MATERIALS/ACCELERATED TESTING

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GEOTECHNICAL/MATERIALS/ACCELERATED TESTING SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Geotechnical exploration for accelerated design	Obtain subsurface information early, including data on contamination potentials; likely done in phases.	Permission to access potential ROW locations
		Need to do in phases, with more information needed at critical structure locations.
		Phased environmental reviews.
		Standard site investigation plus in situation testing.
Ground improvement	Provide for early reduction in settlement potential at specific locations (critical structure locations): <ul style="list-style-type: none"> <li>• Preloading.</li> <li>• Wick drains.</li> <li>• Column supported reinforced soil embankments.</li> <li>• Aggregate piers/stone columns.</li> <li>• Lightweight fills:               <ul style="list-style-type: none"> <li>- Shredded tires.</li> <li>- Flyash.</li> <li>- Geofoam.</li> </ul> </li> </ul>	Some methods are expensive.  Others need time to act.  Early funding.  Early ROW.  Utility issues.  Groundwater.

## GEOTECHNICAL/MATERIALS/ACCELERATED TESTING SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Bridge foundations – Missouri River Bridge	<p>Consider high-capacity elements to speed construction of foundation units.</p> <ul style="list-style-type: none"> <li>• Advanced foundations/substructure contract.</li> <li>• Design phase load test program.</li> <li>• Constructability reviews on foundations.</li> </ul>	<p>Lack of regional/experienced contractors for large pipe piles.</p> <p>Large diameter pipes. See Woodrow Wilson (VA) bridge example &amp; Caltrans examples.</p> <p>Existing bridge may require additional foundation work.</p> <p>Missouri River level, if high.</p> <p>Vibration effects on existing structures.</p>
Bridge foundations – other bridges	<p>H-pile standard; consider:</p> <ul style="list-style-type: none"> <li>• Drilled shafts.</li> <li>• Shallow foundations – preferred for accelerated construction considerations.</li> <li>• Pipes.</li> <li>• Concrete.</li> <li>• Monotubes and tapertubes.</li> <li>• Design phase load test program.</li> <li>• Constructability reviews on foundations.</li> </ul>	<p>With drilled shafts water table is an issue; slurry might be needed.</p> <p>May need ground improvement to use shallow foundations.</p> <p>Need to provide temporary shoring for spread footings.</p> <p>There is concern for the proximity of new bridge foundations to the existing bridge; potential interference.</p> <p>Need to address settlement criteria for shallow foundation use.</p> <p>Look at vibration effects on existing structures.</p>
Embankments/cut slopes	<p>Accelerate embankment construction and refine quality by improving monitoring techniques and material characteristics:</p> <ul style="list-style-type: none"> <li>• Intelligent compaction.</li> <li>• Reinforced soil slopes.</li> <li>• Stockpiling dredge materials.</li> </ul>	<p>Intelligent compaction is an evolving technology. There is limited local experience.</p> <p>Look at backfill material characteristics for reinforced soil slopes; may need soil retention blankets to establish vegetation.</p> <p>Look at erosion of loess on cut slopes.</p> <p>Look at settlement and stability issues with stockpiles impacting existing structures and utilities.</p>



## GEOTECHNICAL/MATERIALS/ACCELERATED TESTING SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Retaining walls	<p>Use cut walls on Nebraska side:</p> <ul style="list-style-type: none"> <li>• Soil nailing.</li> <li>• Soldier pile or drilled shafts with tie backs.</li> <li>• Tangent pile wall.</li> <li>• MSE walls.</li> <li>• Two-stage construction wall: build flexible wall to allow settlement and place permanent facing at later date.</li> </ul> <p>Look at aesthetic issues on walls: various wall treatments are available.</p>	<p>Design issues with loess and grout bonding.</p> <p>ROW/utilities.</p> <p>Temporary shoring for MSE walls next to existing embankment.</p> <p>Bearing capacity, settlement and slope stability for MSE walls.</p> <p>Gradation and electrochemistry testing for backfill.</p> <p>Loss of backfill through panels.</p>
Materials and testing	<p>Use high-performance materials: steel and concrete.</p> <p>Use self-consolidating concrete for drilled shafts.</p> <p>Use pile load tests, CSL tubes. Precast pier caps and deck panels.</p>	<p>Buy steel early.</p> <p>Do special testing for EPS foam, contamination, grouts, ground improvement.</p> <p>Pre-qualify specialty contractors and pre-certify materials using performance specifications.</p>

## STRUCTURES

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STRUCTURES SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Preliminary work	<p>Prepare a conceptual layout for each interchange:</p> <ul style="list-style-type: none"> <li>• Address aesthetics issues.</li> <li>• Reduce number of piers (longer spans).</li> <li>• Simplify geometry (curve/skew) where possible.</li> </ul> <p>Conduct early geotechnical investigation and load testing.</p> <p>Solicit early contractor input.</p> <p>Include user cost of delays in estimate.</p> <p>Pre-qualify and evaluate local materials.</p> <p>Provide early education for contractors on unusual bridges.</p>	<p>Coordinate with road design, materials, geotechnical and construction.</p> <p>Have bridge office refine HDR scope for 30 percent plans:</p> <ul style="list-style-type: none"> <li>• Conduct bridge type study for special cases.</li> <li>• Provide for coordination among consultants.</li> <li>• Identify aesthetics theme?</li> </ul> <p>Have public participate in aesthetics selection?</p> <p>Hire aesthetics specialty sub-consultant.</p> <p>Hold constructability review meetings with contractor (one-on-one).</p>
High-performance materials	<p>Use high-performance concrete (HPC):</p> <ul style="list-style-type: none"> <li>• Slag and flyash.</li> <li>• HPC overlays.</li> <li>• Lightweight concrete.</li> </ul> <p>Use self-consolidating concrete (SCC).</p> <p>Utilize high-performance steel (HPS).</p> <p>Utilize improved reinforcing steel:</p> <ul style="list-style-type: none"> <li>• Stainless steel.</li> <li>• Barney (marine-grade epoxy coating).</li> <li>• Others (FRP, MMFX, etc.).</li> </ul>	<p>Coordinate with materials skill set (especially District 4).</p> <p>Develop pre-qualified concrete mixes.</p> <p>Address lack of information and available test results for FRP and MMFX reinforcing (barrier).</p> <p>Investigate limited field applications of SCC (barrier).</p>

## STRUCTURES SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Precast concrete elements	<p>Use segmental elements:</p> <ul style="list-style-type: none"> <li>• Superstructure (balanced cantilever, span-by-span).</li> <li>• Substructure.</li> <li>• Spliced P/C girders.</li> <li>• Decks.</li> <li>• Full depth deck panels.</li> <li>• Stay-in-place deck forms.</li> <li>• Approach slabs.</li> <li>• Retaining walls (modular and MSE).</li> <li>• Noise walls.</li> </ul>	<p>Coordinate with materials and geotechnical.</p> <p>Acknowledge lack of experience with segmental construction in Iowa (barrier).</p> <p>Address concern over future replacement of deck concrete (barrier).</p> <p>Recommend using sacrificial deck overlay.</p> <p>Address lack of local experience with and concern over durability of connection details for precast elements (barrier).</p> <p>Look at future expandability of segmental bridges (barrier).</p> <p>Need temporary support for P/C spliced girders (barrier).</p>
Contracting methods	<p>Consider design-build.</p> <p>Evaluate modified design-build (bid based on 30 percent plans), which maintains DOT control.</p> <p>Consider alternate design for selected bridges.</p>	<p>Legislation needed to allow D-B construction (barrier).</p> <p>Consider additional design cost for alternates (barrier).</p> <p>Look at reduced control by owners in D-B (barrier).</p>
Minimizing maintenance	<p>Consider integral and semi-integral abutments.</p> <p>Incorporate low-maintenance details.</p> <p>Look at long-life coating systems.</p> <p>Consider two-course decks for new construction.</p> <p>Utilize weathering steel.</p> <p>Construct maintenance-friendly decks (smart deck, heating, ice detection).</p> <p>Use high-performance materials.</p>	<p>Consider initial cost of smart deck and coating systems (barrier).</p> <p>Weigh additional staging/time for two-course deck (barrier).</p> <p>Provide additional training for construction inspection (points of emphasis) and coordination between residencies.</p>

STRUCTURES SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Comprehensive design guidelines	<p>Have a master aesthetics plan for standardized repetitive details.</p> <p>Utilize temporary structures, i.e., Bailey bridge, Acrow, etc.</p> <p>Consider simple span steel girders (made continuous for LL).</p> <p>Aim for 100-year design life.</p> <p>Provide for early finalization of specifications. Include contractors when possible.</p> <p>Consider performance-based specifications.</p> <p>Conduct a comprehensive evaluation of design criteria (LRFD?).</p> <p>Include expandability of bridges (future widening, loading).</p> <p>Provide for higher loadings (HS25 or other).</p> <p>Address security issues.</p>	<p>Look at the following barriers:</p> <ul style="list-style-type: none"> <li>• Ability to predict future design loading and traffic demand.</li> <li>• Cost of additional capacity.</li> <li>• Local experience with simple span steel girders.</li> <li>• Learning curve for LRFD.</li> <li>• Additional cost for bridge-hardening details.</li> <li>• Available personnel for early investigation.</li> </ul>
Foundations and geotechnical	<p>Consider expanded polystyrene (EPS or geofoam) fill.</p> <p>Use mono-drilled shafts (large diameter without cap).</p> <p>Evaluate alternate foundations.</p> <p>Consider drilled shaft foundations.</p> <p>Utilize secant pile walls.</p> <p>Utilize standardized foundations for sign structures.</p> <p>Consider alternate foundation design plans for bidding.</p>	<p>Investigate whether soils are compatible with drilled shafts and secant pile walls.</p> <p>Address lack of local experience with EPS and secant pile walls.</p> <p>Weigh the cost of EPS (barrier).</p>

## STRUCTURES SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Accelerated construction techniques	<p>Pre-assemble elsewhere and barge into place (I-80 Missouri River).</p> <p>Utilize rapid-cure concrete.</p> <p>Construct segmental bridges (balanced cantilever).</p> <p>Consider side launching or skidding superstructure.</p> <p>Utilize self-propelled modular transporters (SPMTs).</p> <p>Construct piers beneath existing bridge.</p> <p>Reduce field construction in winter months.</p> <p>Identify early construction before closing existing structure.</p>	<p>Investigate potential additional cost of accelerated construction (may be balanced by user benefits).</p> <p>Address lack of local expertise in areas such as post-tensioning.</p> <p>Address contractor resistance to extensive use of prefabricated components (barrier).</p>

## RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION

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### RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
<b>RAILROAD COORDINATION</b>		
Relocate CBEC railroad	Omnitrack is willing to work with the DOT. CBEC railroad was built to provide competition with BNSF and UP for coal transport to Council Bluffs Power.	It may be difficult to convince railroads to relocate.
Relocate BNSF along the CBEC south	Abandon the South Expressway line. This would shorten the Interstate bridge.	
Relocate Weyerhaeuser and the elevator lines		ROW title always unclear. Railroads very reluctant to open up ROW issues. Weyerhaeuser only business served by BNSF. Option: relocate Weyerhaeuser. Relocate grain elevator. Relocation brings contaminated soil into consideration.
Conduct an independent expert study on rail systems	HDR is currently conducting an independent study of the railroads in Council Bluffs.	This will take a significant amount of coordination.
Find ways to cost share with railroads for a win-win situation	IA has many possible areas to cost share, including reducing tracks and shortening structures. Share savings with railroad to improve their operations. UP needs five tracks now to build trains.	
Build a new railroad corridor south of I-29/I-80 that would serve both Council Bluffs and Omaha. Combine this with a truck facility	Meet with trucking companies about the 24th Street congestion.	There is a significant amount of truck traffic from the Interstate and, if congestion gets bad enough, trucking operations may move; however, the truck stops are in a pretty good location now.

## RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
UP plans to expand beyond five tracks (some-where??). Develop partnership and cost sharing		
On the I-29 UP railroad bridge, create a spur south, eliminating a line over the Interstate		
On the I-29 UP railroad bridge, consider building the Interstate over the railroad		This would require additional grading and grade changes. Could be difficult with surrounding development.
Construct below surface railroads	Construct tunnels similar to ones in California.	Grade changes and cost are potential barriers.
Address UP railroad bridge issues	Build half of road over and half under existing.	Would have to build one side off site.
Maintain two tracks permanently	Talk with railroad about their plans for possible relocations/consolidations.	

### UTILITIES

Hire a utility coordinator for the project	Will require at least two people in the district devoted solely to utilities, one for administration and one to deal with events in the field.	The district currently does not have anyone working only on utilities.
Start utility contact and location process immediately	All companies should be identified by now. Get everything in writing as soon as possible. Identify one local contact person with each utility company immediately.	This may take quite a bit of up-front effort.
Build/buy a satellite on-site office for the utilities coordinators/other staff	Needs to be a project office in Council Bluffs so staff isn't running back and forth between the district office in Atlantic.	This will take some time to set up.



## RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Hold monthly utility meetings beginning now	Designate one day each month (i.e., every 3rd Tuesday) to have utility meetings. These meetings would include the project utility coordinators, city personnel and local utility contacts (need to be identified). More frequent meetings will be needed as construction approaches.	Talk about the project development and various utility concerns. Would be good to include design personnel. It might be difficult to find a time to meet – possibly over lunch.
Buy enough ROW to accommodate utility lines	Tell the utility companies to design and relocate as soon as it's purchased. Lay out corridor boundaries to adjacent street. Put utilities on green space with back-door access.	This will cost more money up-front but could save money because of fewer delays later.
Utilize SUE	Use the highest level of SUE in places where there is a lot of conflict or where you need to know the depth of the utilities.	This will cost more but could save in expensive locations or re-work later.
Consider paying for utility relocation (or just the engineering)	Will accelerate utility relocation and minimize delays later in the project.	This costs more but could minimize delays.
Consider incentives for early relocation	Could accelerate utility relocation and minimize delays later in the project.	This costs more but could minimize delays; it may depend on how many companies are interested.
Include some types of utility relocation in high-way contracts, i.e., water and sewer	Would require less coordination between projects. This could minimize delays and finger-pointing.	Requires more up-front coordination.
Have DOT give utility companies suggestions on where to relocate	Is easier/less work for the utility companies to find places on their own.	Utility companies may not like DOT suggestions. It may be good to try a couple and see what the response is.
Prepare a GIS map of utilities	Create a GIS map with all the utility locations so they are all in one place. All the utility companies will know where the others are.	Right now we only have water and sewer. It will take some time/effort/money to get them all together.

## RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Leave fiber optics in place along railroad ROW		Too expensive to move.
Have DOT build common utility duct	Have each utility take ownership of their duct later. Include DOT ITS and traffic in the ducts.	Up-front cost may be a barrier.
Develop a project ftp site	Would make it easier for utility companies and DOT to exchange large files quickly.	
Specify a CADD program to be used by everyone	Could share files more easily and everyone could see them.	Not everyone may have the same software. Identify standards/protocol early so everyone knows what's expected.
Relocate all overhead utilities in interchanges		
List all utilities on the bridges, both before and after construction	Would make it possible for everyone to know where the utilities are.	This would involve substantial time and effort but minimal cost. Offers a high benefit for the cost in the end.
Note peak power times in work	Try to minimize utility shutdowns during peak times.	

### RIGHT-OF-WAY

Establish a regional office	Move senior acquisition agent(s) to field office to field questions.	
Reduce acquisition/condemnation time	Involve ROW office as soon as possible.	
Summarize ROW needs and impacts	Do as soon as possible – don't forget the needs of businesses.	
Provide incentives for early move-outs	Would reduce possible ROW delays.	DOT would need to provide income protection for owners who are renting.

## RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Secure innovative financing for real estate acquisition	Provide financing necessary to purchase all ROW at once. If this is not possible, focus on priority segments or problem areas.	Iowa currently does not use innovative financing ideas – it’s “pay as you go.” Would need legislation to change this.
Make sure all minorities and non-English speaking Council Bluffs residents are contacted	Hold neighborhood meetings. Consider if meeting times are appropriate, whether babysitters are needed, if translators are available (from local universities?). Consider door-to-door contacts: FHWA has literature in Spanish.	State needs to make sure environmental justice issues are addressed. Work through churches. People do not come to meetings. Must consider multiple languages.
Complete as much of the design as possible prior to ROW acquisition	Would make it easier for ROW and prevent an agent from having to go to the same person twice.	The design may change as new issues come up.
Have owner buy-in on all noise walls and barriers – no surprise noise walls later	Make sure all noise walls are identified ahead of time (both those that are required and those that are wanted by neighborhoods) – noise walls were a problem on I-235.	
Do a relocation plan and include the needs of businesses		
Work on environmental and cultural issues early so ROW needs are identified ASAP	Would be best if the work could be done now – don’t want surprises during construction.	There will be less delay during construction – extra time up-front will save time later.
Develop a project-specific web site and include a link for ROW issues and the ROW process specific to this project	Provides place for public to go if they have general ROW questions in Council Bluffs.	Someone will have to maintain the web site.

## RIGHT-OF-WAY/UTILITIES/RAILROAD COORDINATION SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Consider any possible bike trails before ROW acquisition begins	Will make it easier for ROW and prevent an agent from having to go to the same person twice.	It is hard to know everything ahead of time – learn from the I-235 project.
Modify Iowa code 6B to allow ROW to purchase corridors to allow utilities time to relocate		In Iowa, must justify condemnation and need a design for justification. This is a barrier to advance purchase of ROW.
Provide proactive project management	Rent back properties and vacant lots to adjacent lots. Keeps grass cut and maintains a neighborhood look.	
Incorporate aesthetics into design prior to ROW acquisition	Will make it easier for ROW and prevent an agent from having to go to the same person twice.	
Look at whether drilling shafts will cause subsidence and expose utilities or hazardous materials	Consider this in the design to avoid delays in ROW and problems during construction.	
Designate ROW priority corridors	Prioritize the different project segments and buy ROW accordingly.	
Implement corridor preservation	Will prevent expensive development and unnecessary ROW costs later.	

## ROADWAY/GEOMETRIC DESIGN

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ROADWAY/GEOMETRIC DESIGN SKILL SET		
IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Consider SPUIs	Use SPUI design for 24th Street interchange and/or the Madison Avenue interchange.	24th Street is very tight at the terminal: an SPUI could provide more distance. Develop a layout, and compare the costs and traffic operation.
Realign SB on-ramp at Nebraska/23rd	Construct a two-lane entrance from the southbound ramp from 23rd Avenue, and realign connections to the Interstate.	Proposed design has westbound traffic in the left (east) lane and eastbound traffic in the right (west) lane.
Improve circulation around MAC/Casino	Build a perimeter road around the MAC and Bluffs Run Casino area. The ring road should have connections to both 24th Street and Nebraska/23rd.	Proposed design has westbound traffic in the left (east) lane and eastbound traffic in the right (west) lane.
Grade separate the railroad crossing for the Ameristar access road		The casino is a possible funding source for this improvement.
Improve local circulation routes	Put a crossing across the rail yard north to south at the west and east ends of the yard and improve north-to-south circulation. Extend north/south along Indian Creek. Provide an additional local street crossing over the river.	BNSF may consider closing line that currently runs just west of the power center.
Consolidate railroads	Pursue consolidating railroad lines, and pursue abandonment of the line through the power center.	BNSF may consider closing line that currently runs just west of the power center.
Provide for neighborhood green space	Look for opportunities to create green space behind noise barrier walls.	

## ROADWAY/GEOMETRIC DESIGN SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Improve access to 275 from the north and west	Identify staging areas that could impact neighborhoods – parking itself will be a challenge. Start thinking about this early.	
Reduce width of railroad bridge over I-29	Look at options for the UP bridge – could shorten the yard to reduce the number of tracks on the Interstate bridge.	
Place all I-29 traffic on outside of dual divided section	Use the outside lanes of the dual divided section to carry all I-29 traffic and local I-80 traffic. This would eliminate two ramps at each end of the dual divided (including a possible left-hand off ramp).	
Provide for future expandability of east systems interchange	Accommodate future C-D roads between eastern system interchange and 275 interchanges. Right-of-way could be purchased now and the roads built later.	
Develop an aesthetics advisory committee	Consider aesthetics as the design progresses. The many bridges along the corridor and even the median barrier provide opportunities for enhancements.	Include artists, geotechnical engineers and structural engineers on the aesthetics committee.
Incorporate HOV lanes into the design		Projected use of HOV lanes is low.
Take I-29 over the UP tracks	Change design to take I-29 over the UPRR tracks.	Geotech group has concerns with this idea, and the profile may not work even with maximum allowable grades.

## ROADWAY/GEOMETRIC DESIGN SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Provide median barrier openings	Include openings in the median barrier to aid with incident response and maintenance activities. Remote-controlled gates could be used to ensure that the openings are only used by authorized vehicles.	Work with maintenance and emergency response agencies for the proper placement and design.
Consider operational issues in staging design	Staging plans should provide adequate speed change lanes and emergency pullouts. Create a traffic management plan during preliminary engineering. Provide adequate drainage during each stage of construction.	
Provide for alternate median barriers	Consider the use of cable barrier to separate traffic flowing in the same direction (dual divided area) – this may provide flexibility for future lane configurations (e.g., additional capacity).	
Buy ROW to widen median for future expandability		

## LONG LIFE PAVEMENTS/MAINTENANCE

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### LONG LIFE PAVEMENTS/MAINTENANCE SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Minimum maintenance: no structural rehabilitation for approximately 50 years	Minimum pavement maintenance will not require daytime lane closures for at least 50 years, limiting maintenance impacts on traffic.	Will need to do the following: joint/crack sealing and restoring friction and ride to pavement surface. Construction sequenc- ing and construction time limitations, as well as present contracting methods, may present challenges in constructing long-life pavements. Lack of expertise/experience with the agencies and contractors is an issue.
Performance indicators	Use performance indicators such as IRI, friction, distress, noise.	Would use the performance indicators as initial performance/construction standards. They would also be used in a warranty contract for pavement rehabilitation.  Determining acceptable limits/thresholds for the performance indicators is a potential barrier.
Contract maintenance	Have maintenance on-call during construction. Contract maintenance operations after construction.	On-call maintenance is designed to fix problems outside of the contractor's responsibility.
Pavement type	Consider long-life pavement.	Consider stone matrix asphalt, CRCP, perpetual pavements, composite pave- ments, subgrade treatments, subgrade stabilization, subbase width and pavement drainage issues.
Warranty	Discuss bonding issues and length of warranty (5, 10, 15 or more years).	Becomes an issue depending on length of warranty. Becomes an issue with multiple contractors (i.e., who is to blame when something goes wrong?). Consider A-plus- B bidding.



## LONG LIFE PAVEMENTS/MAINTENANCE SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Design-build (D-B)	Use the design-build finance, operate and maintain procedure (DBFOM) in highway construction.	There are legal issues in Iowa (illegal). No contractors are large enough to attack this problem so would need the use of consortium. Does the Iowa DOT embrace this concept? Construction is started before design is complete, which allows for quicker design changes and opens facilities to the public sooner.
Construction staging sequencing	Set staging for larger work zones with longer pavement runs. Minimize temporary pavement. (Minimize throwaway.) Use existing lanes during project construction.	Barriers include waste of resources, additional joints, possible reduction in quality and increased cost. Can the road be closed for an extended period of time? How about the eastbound lanes only?
Snow removal and storage	Address snow removal and storage on dual divided sections, fly-overs, structures. Need crossover into Nebraska for turnaround and taller barrier rails. Consider anti-icing bridge decks.	Shoulder storage areas may be insufficient, and drainage inside the dual divided portion may be an issue. Throwing snow onto traffic below on the fly-overs is a concern. Manpower for snow removal becomes an issue with the lane width. Can be solved with platoon plowing. Consider automatic de-icing of the rails on bridges. Use multi-lane snowplow trucks. Heat pavements and barrier rails with waste heat from power plants.
Incident management/redundancy	Consider built-in lanes/shoulders for emergency response on fly-overs, changing of luminaries, bridge inspections and other maintenance activities (lots of them). Provide median cross-overs for EMS (and snowplows). Quick fix for attenuator repairs; not major reconstruction.	Build fly-overs two lanes wide but stripe for one lane, and construct full depth and full width inside and outside shoulders. Install permanent maintenance signs that are removable or easily activated. Utilize ITS, DMS and traffic sensors. Install median cross-overs for emergency vehicles (and snow plows).
Sign maintenance	Need to provide for easier and safer signage access.	Construct a catwalk? Need rotating/permanent signage that is removable or easily changed. Signs on tracks (yes, on trusses) or flanges are not a problem.

## LONG LIFE PAVEMENTS/MAINTENANCE SKILL SET

IDEA (Short Name)	IDEA (Detailed Description)	Implementation Details (Barriers, Skill Set Coordination, etc.)
Accelerated construction	Consider 24/7 shutdown of the road; if not possible, shut down in one direction.	Concerns include business impacts, increased construction costs and potential traffic tie-ups elsewhere.
Contractor access	Consider plant site (State-furnished?), storage, and mobilization of equipment and supplies.	Need land space. Should the State buy the space and furnish it?
Innovation	<p>Consider luminary changes.</p> <p>Evaluate contract size: consider administration of many small contracts versus one large contract and the need for a project warranty.</p> <p>Discuss lane rental – rewards for good traffic flow.</p>	<p>Utilize mast lighting, stadium lighting and swing mast arms.</p> <p>On small contracts; who is responsible for project management? Do bigger contracts start minimizing costs? How large of a contract is needed to attract design-build? One contractor being responsible for pavement and embankment construction would eliminate the passing of the buck.</p> <p>Traffic speed – 45 mph; don't pay for lane rental. Use traffic monitors like side-fired radar for determination of speed or density.</p>

## ACTT Skill Sets

**Innovative Financing.** The team's primary goals are to align potential financing options with project goals; match anticipated cash flow with project management; and provide options for managing competing priorities for existing resources.

**ROW/Utilities/Railroad Coordination.** The ROW group's primary role is to ensure that ROW, utilities and railroad work comply with state laws and procedures. They must also consider the numbers and types of businesses and residences impacted by a project and evaluate the ready availability of additional right-of-way.

**Geotechnical/Materials/Accelerated Testing.** The geotechnical team explores subsurface conditions to determine their impact on the project; pursues options for expediting materials acceptance and contractor payment; and evaluates the use of innovative materials in accordance with project performance goals and objectives.

**Traffic Engineering/Safety/ITS.** The traffic engineering team strives to enhance safety; improve traffic management; and explore technologies, including ITS systems, that will communicate real-time construction information to the public.

**Structures (Bridges, Retaining Walls, Culverts, Miscellaneous).** The structures skill set focuses on accelerating the construction of structures. Their task is to identify the most accommodating types of structures and materials that will meet design requirements and minimize adverse project impacts.

**Innovative Contracting.** The innovative contracting group explores state-of-the art contracting practices and strives to match them with the specific needs of the project.

**Roadway/Geometric Design.** The roadway team evaluates proposed geometrics and identifies the most accommodating product with the minimum number of adverse impacts.

**Long Life Pavements/Maintenance.** The maintenance skill set identifies pavement performance goals and objectives and explores future maintenance issues for the project corridor, including winter service, traffic operations and preventative maintenance.

**Construction (Techniques, Automation and Constructability).** The construction crew explores techniques that will encourage the contractor to deliver a quality product within a specific timeframe while maintaining traffic.

**Environment.** The environment team ensures that the scope of work and construction activities reflect local environmental concerns. Their goal is to provide the most accommodating and cost effective product while minimizing natural and socio-economic impacts.

**Public Relations.** The public relations skill set discusses ways to partner with local entities and effectively inform both local communities and the traveling public about the project before, during and after construction. Their role is to put a positive spin on the project.

## Background of ACTT

ACTT is a process that brings together public- and private-sector experts from across the country in a setting that encourages flexibility and innovation. The goal is to recommend technologies that will accelerate construction time while reducing user delay and community disruption. This necessitates a thorough examination of all facets of a highway corridor with the objective of improving safety and cost effectiveness while minimizing adverse impacts to the traveling public.

The ACTT concept was originated by the Transportation Research Board (TRB) in conjunction with FHWA and the Technology Implementation Group (TIG) of the American Association of State Highway and Transportation Officials (AASHTO). Following the completion of two pilot workshops, one in Indiana and one in Pennsylvania, the originating task force, A5T60, passed the concept off to FHWA and TIG to continue the effort. They have done so by coordinating a series of ACTT workshops around the country, with several more pending in 2006.

More information on the ACTT program is available online at <http://www.fhwa.dot.gov/construction/accelerated/index.htm>.